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Gregory

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(54) **HYDRAULIC PRESS PLIERS POWER HAND TOOL**

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(51) **Int. Cl.**

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B25B 7/12	(2006.01)
B25B 7/02	(2006.01)

(52) **U.S. Cl.**

CPC ***B25B 7/126*** (2013.01); ***B25B 7/02*** (2013.01); ***B25B 7/12*** (2013.01)

(58) **Field of Classification Search**

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USPC 81/301
See application file for complete search history.

(56) **References Cited**

U.S. PATENT DOCUMENTS

2,487,281 A *	11/1949	Steckelberg	.....	B25B 7/123 81/301
2,778,259 A *	1/1957	Moir	.....	B25B 7/123 188/314
3,372,479 A *	3/1968	Fischer	.....	B25B 7/126 30/180
3,706,245 A *	12/1972	Van Schaik	.....	B26B 17/02 30/180
4,031,619 A *	6/1977	Gregory	.....	B25B 5/061 30/180

(Continued)

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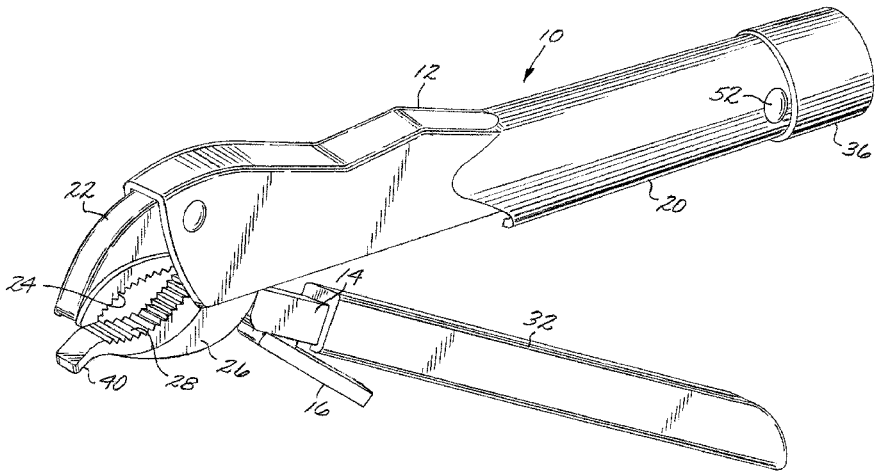
(57) **ABSTRACT**

A hand operated hydraulic press pliers tool is provided comprising an upper stationary handle having a fixed serrated upper jaw portion forming the front end of the stationary handle and a tubular portion forming the rear end of the stationary handle. A serrated lower jaw is pivotally attached to the stationary handle and disposed opposing the upper jaw portion. A hydraulic cylinder assembly is centrally disposed within the upper stationary handle and pivotally attached at one end within the tubular portion of the upper stationary handle near the rear of the handle, and the front end of the cylinder assembly pivotally attached to the lower serrated jaw between the lower jaw pivot handle attachment point and the serrated portion of the jaw. A lower tool handle is pivotally attached to the cylinder assembly yoke that is the front end of the pump assembly. A pivotally attached lower tool handle provides a pump lever disposed to engage a concentrically disposed hydraulic pump assembly within the cylinder assembly wherein depressing the top of the hydraulic pump assembly forces fluid into the cylinder assembly expanding the length of the cylinder assembly when the handles are squeezed together by a user. The longitudinal expansion pivots the lower serrated jaw towards the upper serrated jaw gripping a work piece disposed by a user between the jaws. Repeated cycles of squeezing and releasing the handles of the tool effectuate an incremental closure of the jaws onto a work piece with increasing pressure with each squeezing cycle.

15 Claims, 4 Drawing Sheets



(56) **References Cited**

U.S. PATENT DOCUMENTS

4,136,549	A *	1/1979	Lytle	H01R 43/0427 29/751
4,248,077	A	2/1981	Gregory	
4,263,801	A	4/1981	Gregory	
4,342,216	A	8/1982	Gregory	
4,351,097	A *	9/1982	Hashimoto	B25B 7/12 29/229
4,489,471	A	12/1984	Gregory	
4,689,957	A *	9/1987	Gallentine	B25B 1/18 60/477
4,735,048	A	4/1988	Gregory	
4,947,672	A *	8/1990	Pecora	B21F 15/06 137/512.3
6,532,635	B1	3/2003	Gregory	
7,251,980	B2 *	8/2007	Gallentine	B25B 7/123 72/409.01
7,464,578	B2 *	12/2008	Ayer	B25B 27/10 60/477
8,286,461	B2 *	10/2012	Hofmann	B25B 27/10 29/751
8,307,525	B2	11/2012	Gregory	

* cited by examiner

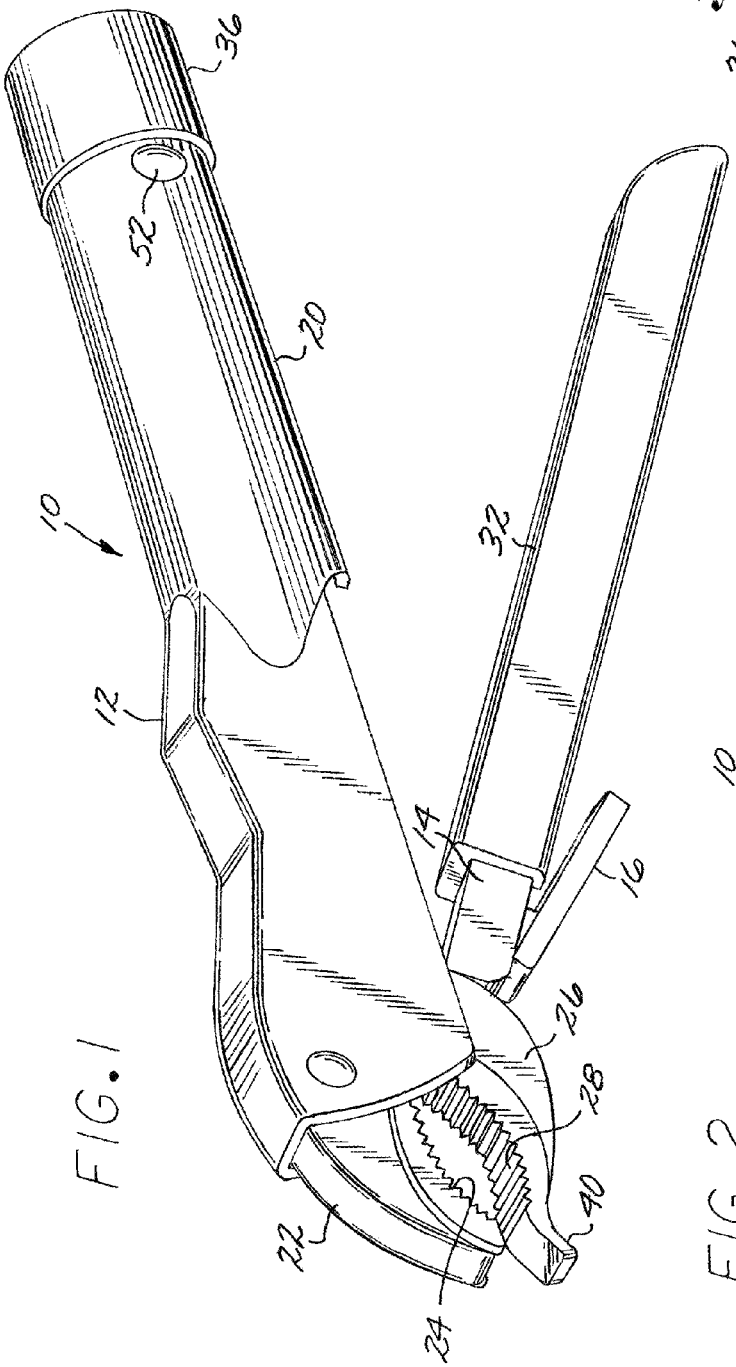


FIG. 1

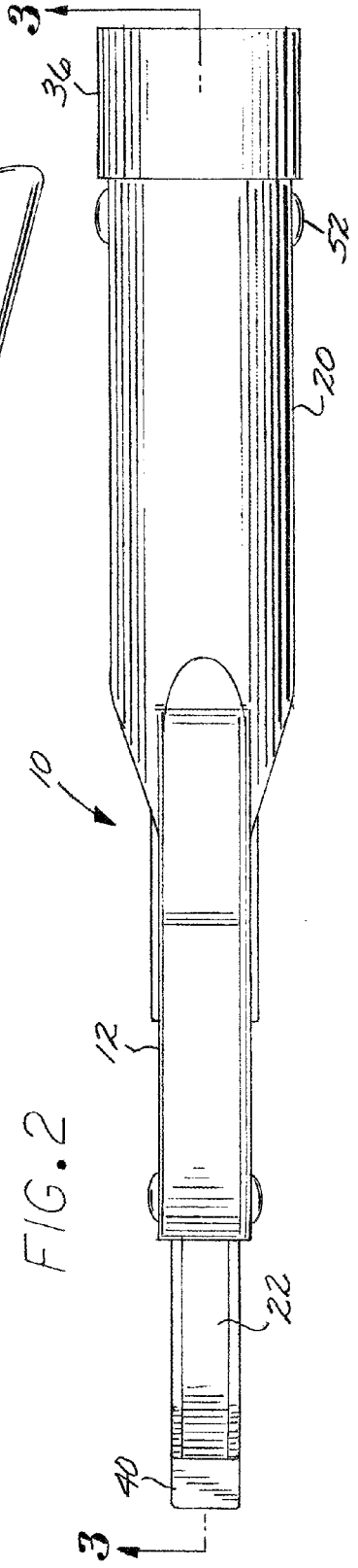
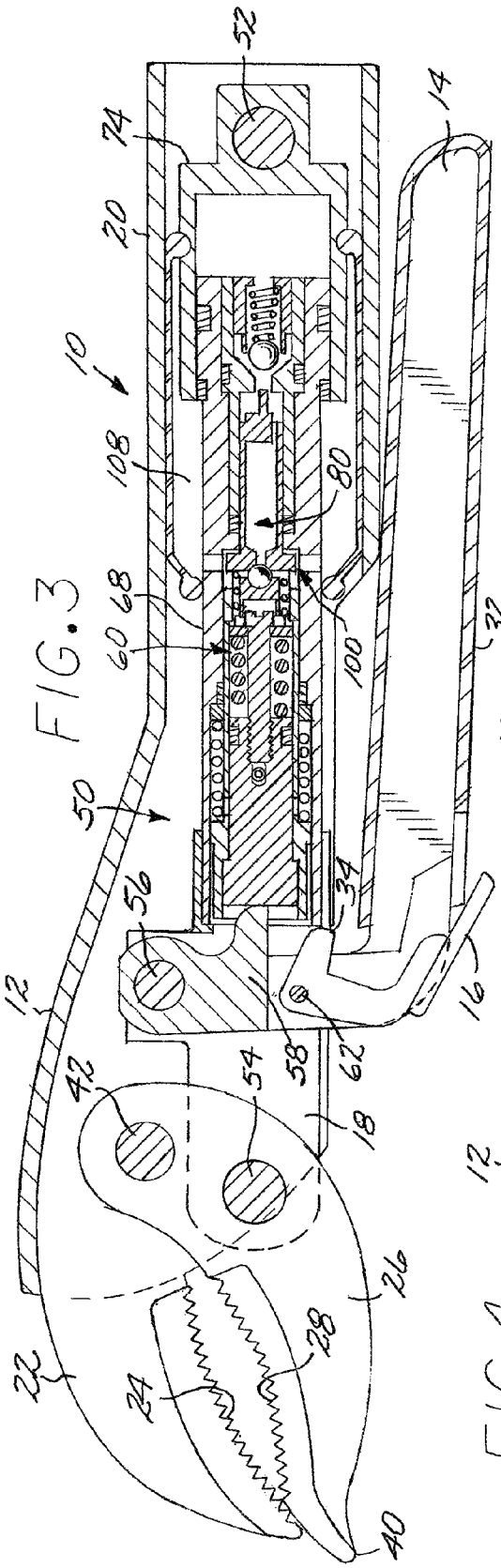


FIG. 2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74
14
20
10
108
80
68
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100
32
50
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34
12
16
42
54
58
62
18
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28
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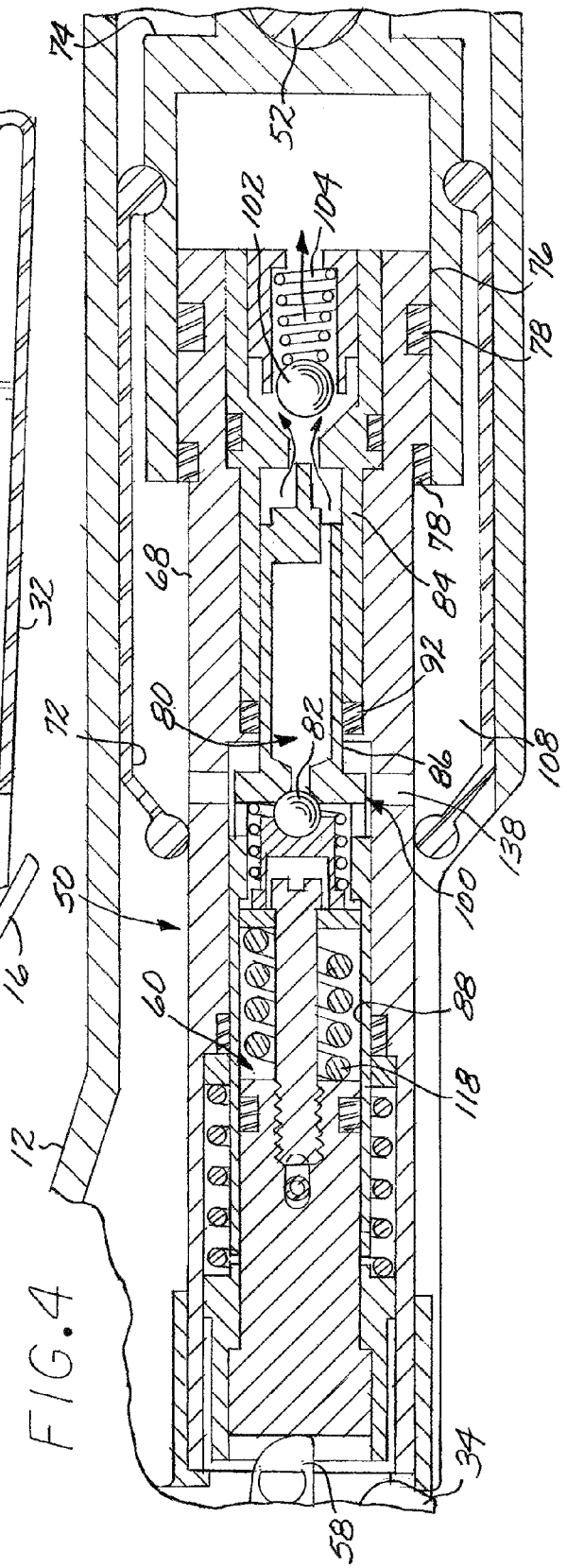
24
40

FIG. 3


74
52
102
104
76
78
68
84
92
72
80
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86
108
138
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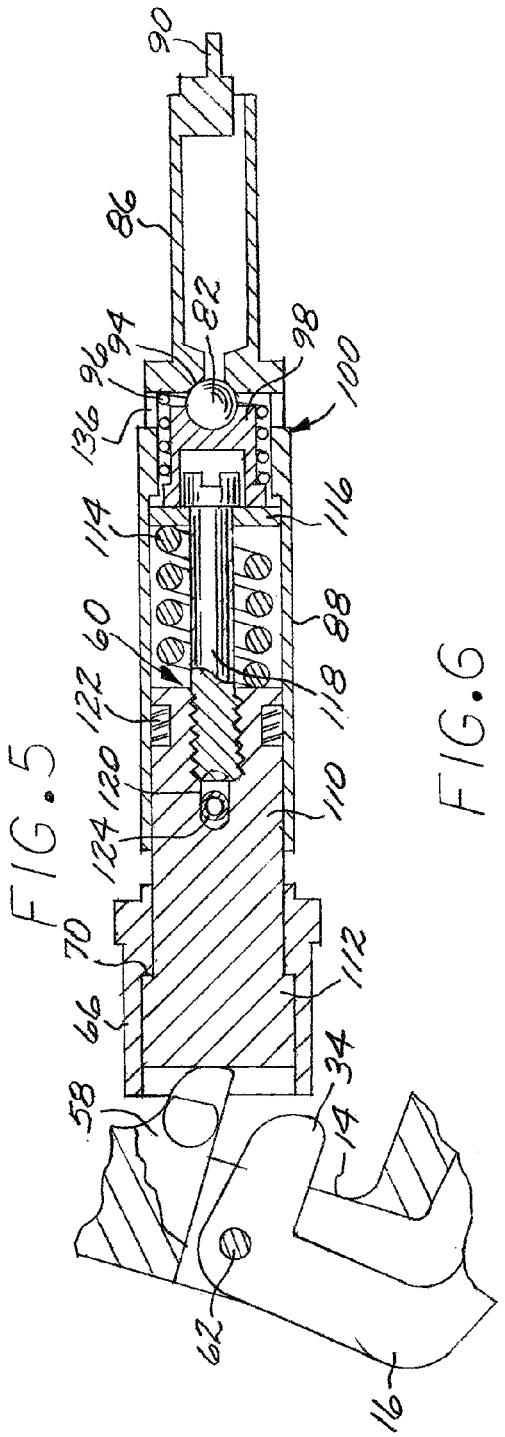
50
60
88
118
12
34
58

FIG. 4


90
86
82
98
100
96
94
136
114
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60
122
88
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120
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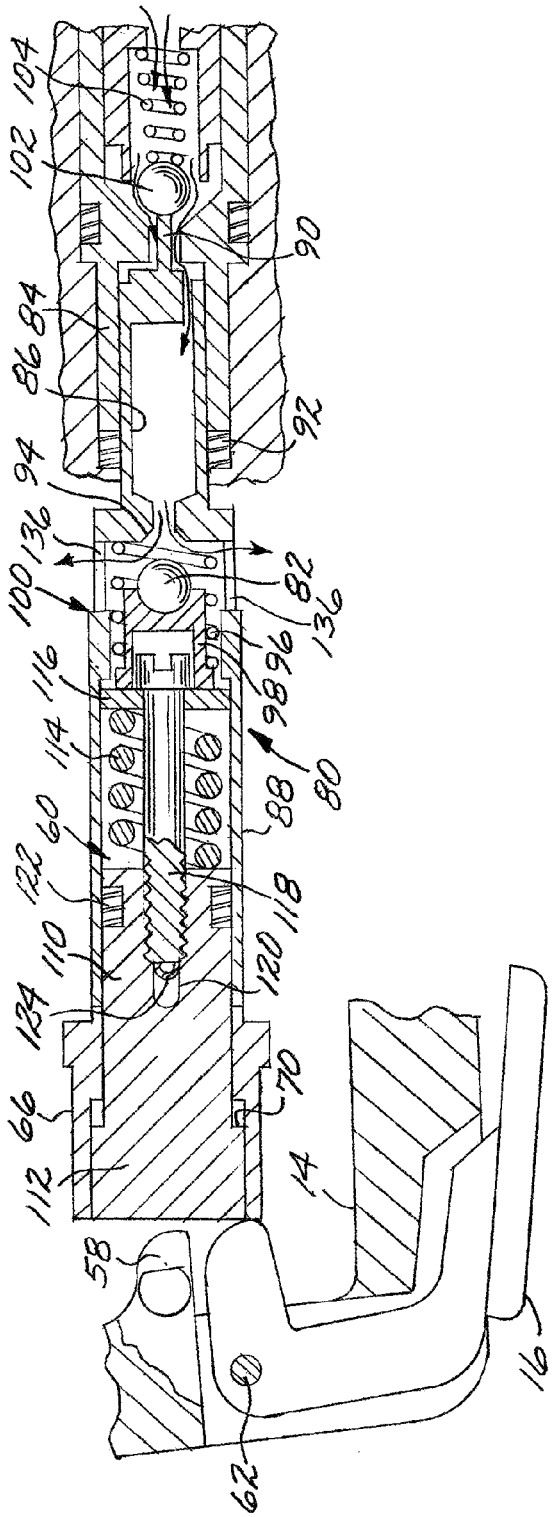
124
70
112
66
58
34
14
62
16

FIG. 5


102
104
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136
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112
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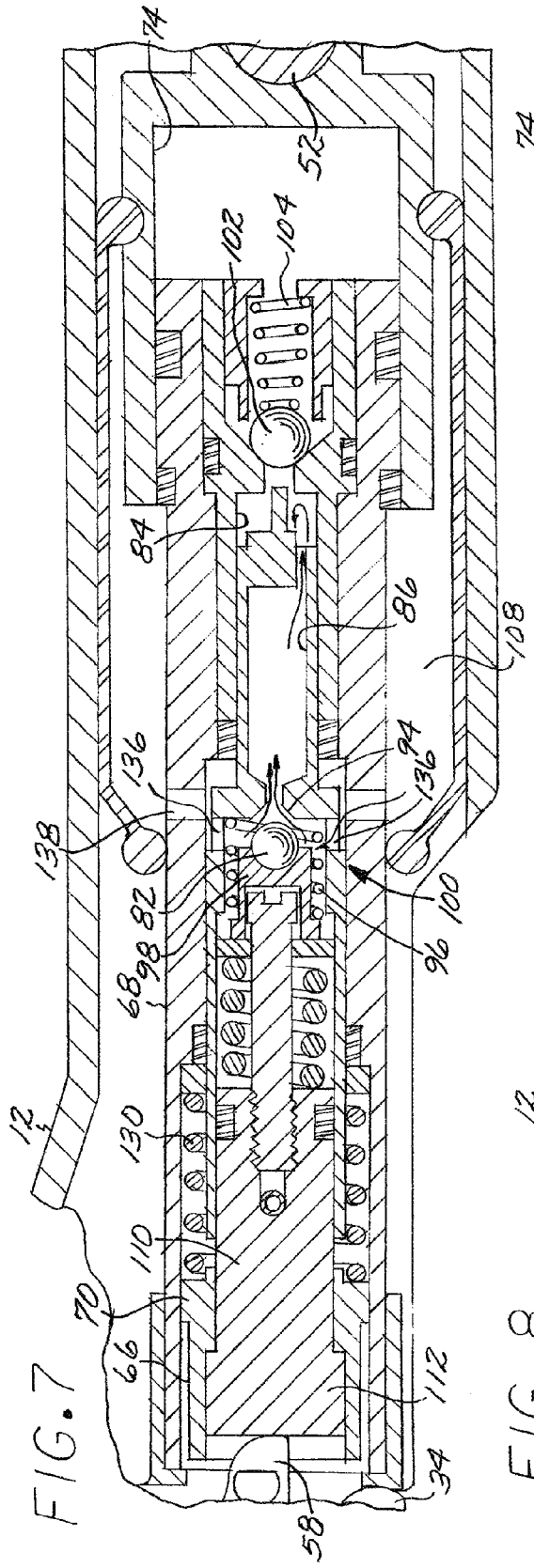
FIG. 6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130
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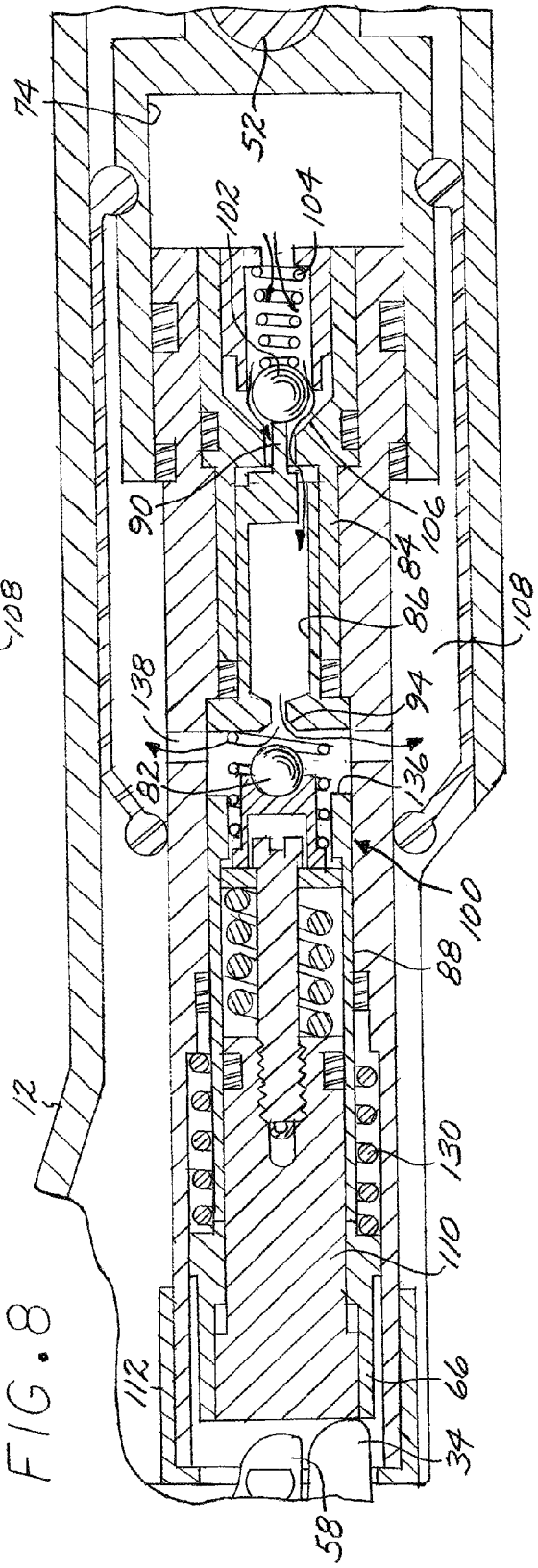
66
112
34
58

FIG. 7


74
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130
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112
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FIG. 8

HYDRAULIC PRESS PLIERS POWER HAND TOOL

RELATED APPLICATIONS

This non-provisional utility patent application, filed in the United States Patent and Trademark Office, claims the benefit of U.S. Provisional Patent Application Ser. No. 61/767,675 filed Feb. 21, 2013 which is hereby incorporated by reference.

FIELD OF THE INVENTION

The present invention relates to the field of press pliers hand tools. More particularly, this invention is directed to a hydraulically assisted press pliers hand tool.

BACKGROUND OF THE INVENTION

Utilizing a hand tool to apply pressure to a work piece is typically limited by the mechanical advantage provided by the tool and the hand strength of a user. Application of higher pressures typically requires assistance of a hydraulic pump and cylinder mechanism requiring mechanisms that either render the tool too bulky to considered a hand tool or too complex and expensive for causal use. Further hydraulically assisted systems can exhibit reliability issues and typically require routine maintenance. What is needed is a simple hydraulic hand tool capable of providing high pressure to a work piece while being simple to use, reliable, simple to manufacture, low cost and easy to maintain.

BRIEF SUMMARY OF THE INVENTION

Accordingly, it is an object of the present invention to provide a new type of press pliers hand tool having high reliability, simplicity, low maintenance, low complexity, ease of use and low cost thereby overcoming the various disadvantages of the prior art.

A hand operated hydraulic press pliers tool is provided comprising an upper stationary handle having a fixed serrated upper jaw portion forming the front end of the stationary handle and a tubular portion forming the rear end of the stationary handle. A lower serrated jaw is pivotally attached to the upper stationary handle and disposed opposing the upper jaw. A hydraulic cylinder assembly, having a front and rear end, is further centrally disposed within the tubular portion of the upper stationary handle with the cylinder assembly rear end pivotally attached within the tubular portion of the upper stationary handle near the rear of the handle, and the front end of the cylinder assembly pivotally attached to the lower serrated jaw between the lower jaw pivot handle attachment point and the serrated portion of the jaw. A lower tool handle, having a proximate and distal end, is pivotally attached, at the lower tool handle proximate end, to the cylinder assembly yoke, the yoke being the front end of the cylinder assembly. The lower tool handle further provides a handle pump lever disposed to engage the top of the hydraulic pump assembly wherein depressing the top of the pump assembly forces fluid into the hydraulic cylinder assembly thereby expanding the length of the cylinder assembly when the lower moving handle and the upper stationery handle are squeezed together by a user. The longitudinal expansion of the cylinder assembly pivots the lower serrated jaw towards the upper serrated jaw gripping a work piece disposed by a user between the jaws. When the lower moving handle is retracted, valves within the pump assembly retain hydraulic fluid within the hydraulic cylinder assembly and the extended length and pressure is maintained, additional hydraulic fluid is drawn into the pump assembly on this back stroke and the cylinder assembly again extends in longitudinal length and internal pressure increases on the next forward stroke. Repeated cycles of squeezing and releasing the handles of the tool effectuate an incremental closure of the jaws onto a work piece with increasing pressure with each squeezing cycle.

Releasing the press pliers from a work piece requires a user to activate a release handle being pivotally attached to the lower moving handle and having a release lever cam disposed to engage a release collar disposed around the circumference of the pump piston assembly centrally disposed within the tool piston portion of the hydraulic cylinder assembly. The distal end of the pump piston has a push pin centrally disposed to engage the pump outlet check valve that maintains the pressure within the hydraulic cylinder assembly, forcing the valve open and relieving hydraulic fluid out of the hydraulic cylinder assembly and ultimately back to a hydraulic fluid reservoir ready for being drawn back into the hydraulic pump assembly when the tool next engages a work piece.

Preloaded check valve springs, all centrally and longitudinally disposed, are provided to insure that a user cannot over pressure the hydraulic fluid of tool or damage the tool, principally through repeatedly squeezing the handles of the tool with the jaws clenched, by venting hydraulic fluid back to the reservoir or preventing the uptake of fluid into the pump. When preset pressures are attained, the pump assembly will not extend further in length or increase applied pressure between the jaws.

The elements of the pump assembly are longitudinally disposed within each other making manufacturing and assembly simple and low cost. The elements are also arranged to minimize the total number of components wherein single elements provide combined functions required by hydraulic pumping systems having lower mechanical tolerances and lower cost material types than typically required thus providing further lower cost advantages, reliability and a compact, light weight design necessary for hand tools. The hydraulic assist facilitates application of pressure to a work piece much higher than obtainable with similar sized mechanical hand tools.

What is needed is a new type of hydraulic cylinder and pump combination as provided by a multifunction pump valve, piston and cylinder facilitated by a valve crowd assembly integrated into a hydraulic cylinder as accomplished by the present invention as herein disclosed.

BRIEF DESCRIPTION OF THE DRAWINGS

The accompanying drawings, which are incorporated in and constitute a part of this specification illustrate embodiments of the invention and, together with the description, serve to explain the features, advantages, and principles of the invention.

FIG. **1** is a isometric view of an embodiment of the press pliers according to the present invention wherein the essential features of the apparatus are visible including the upper stationary handle, jaws, release lever and lower moving handle.

FIG. **2** is a top plan view of the press pliers of FIG. **1**.

FIG. **3** is a side elevation cross sectional view taken along Line **3-3** of FIG. **2** wherein showing the spatial relationship of the various elements according to the present invention.

FIG. **4** is a sectional view of the illustration of FIG. **3** showing the press pliers in the forward stroke configuration wherein the crowd assembly and hydraulic pump assembly compress hydraulic fluid in the pump cylinder by the lower moving handle lever activation. The hydraulic fluid is further forced into the tool cylinder cavity by fluid transfer from the pump cylinder.

FIG. **5** is a sectional view similar to the illustration of FIG. **3** showing details of the various elements of the crowd assembly, the hydraulic pump piston assembly and the release collar. The elements have a spatial relationship consistent with the forward stroke configuration of the press pliers.

FIG. **6** is a sectional view according to the present invention similar to FIG. **5** showing details of the various elements of the crowd assembly, the hydraulic pump piston and cylinder wherein the pump piston is disposed within the pump cylinder with the release collar being depressed by the release lever cam thrusting the push off pin of the pump piston forward. The elements have a spatial relationship consistent with the reverse stroke configuration of the press pliers.

FIG. **7** is a sectional view according to the present invention similar to FIG. **4** illustrating the back stroke configuration wherein the lower moving handle lever is retracted from the crowd assembly thereby moving the crowd assembly outwardly from the pump piston assembly facilitating a replenishment of the pump cylinder with hydraulic fluid from the hydraulic fluid reservoir thereby preparing the pump for the next forward stroke.

FIG. **8** is a sectional view according to the present invention similar to FIG. **4** illustrating the reversing or release configuration wherein the various elements are arranged to relieve the hydraulic pressure within the tool cylinder when activated by disposing the release lever cam over the release collar of the hydraulic pump assembly absent forward motion of the crowd assembly and moving the pump piston forward into the pump cylinder wherein the push pin portion of the pump piston is disposed to lift the pump check valve ball and relieving hydraulic fluid from the tool cylinder.

DETAILED DESCRIPTION OF THE INVENTION

Although particular embodiments of the invention have been described in detail for purposes of illustration, various modifications may be made without departing from the spirit and scope of the invention. Accordingly, the invention is not to be limited except as by the appended claims. Referring now in greater detail to the various figures of the drawings wherein like reference characters refer to like parts, there is shown in an isometric view at **10** in FIG. **1**, a new type of hydraulically activated press pliers hand tool.

FIGS. **1** and **2** illustrate the press pliers **10** according to the present invention having an upper stationary handle **12** having a tubular rear portion **20** and an upper serrated jaw portion **22** forming the front end of the handle **12**. The upper serrated jaw portion **22** has serrations **24** disposed downwardly and opposing lower serrated jaw **26** upwardly facing serrations **28** for engaging and gripping a work piece provided by a user. A lower moving handle **14** is provided with optional lower moving handle grip **32** and arranged to activate a hydraulic cylinder assembly centrally disposed within the upper stationary handle **12**. The lower jaw pivots towards the upper jaw with increasing pressure as a user repeatedly squeezes the lower and upper handles together. The hydraulic pressure on the jaws is released when release handle **16** is depressed by a user. Lower serrated jaw lip **40** provides a lever handle for a user to manually spread the jaws apart when the hydraulic pressure is released.

Referring now to FIG. **3** showing a full cross section of the invention, details of the various elements of the press pliers are illustrated showing the press pliers tool comprising an upper stationary handle **12** having a tubular rear portion **20** and an upper serrated jaw portion **22** forming the front end of the handle **12**, a lower serrated jaw **26** being pivotally fixed at the pivot end to the upper stationary handle **12** by the lower serrated jaw pivot pin **42**. The lower serrated jaw **26** has a front end with the serrations **28** disposed opposing the serrations **24** of the upper serrated jaw **22** of the upper stationary handle **12**. A hydraulic cylinder assembly **50** is centrally and longitudinally disposed within the upper stationary handle **12**. The hydraulic cylinder assembly **50**, having a front and rear end, is pivotally attached to the tubular rear portion **20** of the upper stationary handle **12** by hydraulic cylinder assembly rear pivot pin **52**, the pivot pin **52** being horizontally and perpendicularly fixed to the inside diameter of the tubular rear portion **20** near the rear end of the handle **12**. An optional upper stationary handle rear dust cap **36** may be provided disposed to cover the tubular portion **20** rear opening. The front end of the hydraulic cylinder assembly **50** is comprised of yoke **18** and is pivotally attached to the lower serrated jaw **26** by cylinder assembly front pivot pin **54**. Pivot pin **54** is fixed to the lower serrated jaw **26** at a location offset between the jaw pivot pin **42** and the serrated portion **28** of the lower serrated jaw **26**. The longitudinal length of the hydraulic cylinder assembly **50** extends when activated by the user thereby pressing against pivot pin **54** and necessarily leveraging lower serrated jaw **26** to rotate around jaw pivot pin **42** thrusting the serrations **28** upwardly towards the serrations **24** of the upper jaw **22** and hence engaging and gripping a work piece disposed between the serrations.

The hydraulic cylinder assembly **50** essentially comprises a yoke **18** forming the front end, a tool piston assembly **68** fixed to the yoke **18**, a tool cylinder **74** slideably engaging the rear end of the tool piston assembly **68**, and a hydraulic fluid reservoir **108** around a portion of the circumference of the hydraulic cylinder assembly **50**. Hydraulic fluid flowing into the tool cylinder **74** during a forward stroke forces the tool piston assembly **68** outwardly extending the length of the hydraulic cylinder assembly **50**. The tool piston assembly **68** further comprises a hydraulic pump assembly **80** longitudinally and concentrically disposed within the tool piston assembly **68**. The hydraulic pump assembly **80** is activated by moving the lower moving handle **14** to depress the front end of the tool piston assembly **68** containing a crowd assembly **60** of the hydraulic pump assembly **80**.

Again referring to FIG. **3**, activation of the hydraulic cylinder assembly **50** is accomplished by rotating lower moving handle **14** towards the upper stationary handle **12** wherein the lower moving handle **14** is pivotally attached to the yoke **18** of the hydraulic cylinder assembly **50** by lower moving handle pivot pin **56** located near the proximate end of the handle **14**. The lower moving handle **14** has a pump lever **58** fixed near the proximate end and disposed to contact and press centrally on the crowd assembly **60** of the hydraulic piston assembly **100**. The tool is therefore activated by a user by pressing the lower moving handle **14** and the upper stationary together rotating the lower moving handle **14** around the proximate end pivot in **56** thereby pressing and leveraging the pump lever **58** towards the hydraulic pump assembly **80**. Similarly a release handle **16**

is provided, pivotally attached at the release handle proximate end, to the lower moving handle **14** with a release lever cam **34** disposed to interfere with and engage the release collar **66**, shown in FIGS. **5-8**, surrounding the crowd assembly **60** of the hydraulic pump assembly **80** when the distal end of the release handle **16** is activated by a user. As illustrated, the hydraulic cylinder assembly **50** is suspended between pivot pin **54** at the front end and the pivot pin **52** at the rear end, an arrangement that permits the hydraulic pump assembly **50** front yoke **18** to move with the lower serrated jaw **26** thereby eliminating the need for additional mechanical linkages that would be required if the hydraulic cylinder assembly **50** were fixed stationary within the upper stationary handle **12**. The arrangement has the further advantage of maximizing load transfer to the lower serrate jaw **22**.

As shown in more detail in FIG. **4**, the hydraulic cylinder assembly **50** tool cylinder **74**, forming the rear end of the assembly, slidably receives the outside circumference of the cylindrically shaped tool piston rod **76** portion of the tool piston **68** functioning as a piston for tool cylinder **74**. The tool cylinder **74** is cylindrically shaped having a bottom with a flange portion extending outwardly from the bottom of the cylinder **74**. The flange receives and retains the hydraulic cylinder assembly rear pivot pin **52** pivotally attaching the rear end of the hydraulic cylinder assembly **50** to the upper stationary handle **12**. The outside circumference of the rear portion of tool piston **68**, forming the tool piston rod **76**, is inserted into the tool cylinder **74** thus forming a hydraulic piston for the tool cylinder **74**. Tool cylinder seals **78** disposed around the tool piston rod **76** and within the tool cylinder **74** inside circumference confines hydraulic fluid within the cylinder **74** notwithstanding flow through the centrally disposed pump check valve **102**. As the tool piston **68** front end is fixed to yoke **18**, hydraulic fluid received by the tool cylinder **74** through check valve **102** necessary forces the two ends of the hydraulic cylinder assembly **50** apart analogous to the action of a typical hydraulic cylinder.

The hydraulic pump assembly **80** is centrally and longitudinally disposed within the tool piston **68** comprising the pump cylinder **84**, the pump piston assembly **100** with the rear end being a pump piston **86** and the front end being a valve and manifold housing **88**, the pump ball valve **82** centrally disposed between the pump piston **86** and the valve and manifold housing **88**, and the crowd assembly **60** disposed within the valve and manifold housing **88** and contacting the pump ball valve **82**. As in FIG. **4**, the pump piston **86** portion of the pump piston assembly **100** is cylindrically shaped and slidably received by the pump cylinder **86** with pump seal **92** disposed between the inside circumference of the pump cylinder **84** and the outside circumference of the pump piston **86** together forming a hydraulic piston pump within the apparatus. The crowd assembly **60** slidably disposed within the front end of the pump piston assembly **100** and being in direct contact with the lower moving handle pump lever **58** and further being in direct contact with the pump ball valve **82** closes the ball valve **82** when compressed while also transferring motion from the lower moving handle pump lever **58** directly to the hydraulic pump piston assembly **100** through the surrounding valve and manifold housing portion **88** forcing the pump piston portion **86** into the pump cylinder **84** producing a forward stroke of the pump to compress fluid within the pump cylinder **84**.

In this forward stroke configuration of FIG. **4**, crowd assembly **60** seats the pump ball valve **82** trapping hydraulic fluid within the pump cylinder **84** and compressing the fluid as the pump piston portion **86** moves into the pump cylinder **84** as accomplished by the motion of the lower moving handle **14**. With hydraulic fluid pressures high enough to overcome the check valve load spring **104** and fluid pressures within the tool cylinder **74**, the pump check valve **102** opens and fluid flows into the tool cylinder **74** increasing the volume and pressure within the tool cylinder **74** forcing the hydraulic cylinder assembly **50** to responsively lengthen.

In FIG. **5**, the hydraulic pump piston assembly **100** is illustrated separately wherein the piston portion **86** has a central cavity with hydraulic fluid flow connectivity to the pump ball valve **82** at the front end and a hydraulic fluid pathway at the rear end with connectivity with the pump cylinder **84**. The pump piston portion **86** further comprises a push pin **90** centrally and longitudinally disposed extending from the rear end of the pump piston portion **86** having a length sufficient to lift the tool cylinder check valve **102** from the valve seat for venting hydraulic fluid from the tool cylinder **74** as required during a reversing stroke.

FIG. **6** shows pump piston portion **86** of the hydraulic pump piston assembly **100** being received by the pump cylinder **84** with the pump piston portion **86** fully inserted into the pump cylinder **84** as in the reversing stroke of the press pliers **10**. Note that push pin **90** is contacting and lifting pump check valve **102** open permitting hydraulic fluid flow back into the pump cylinder **84**, through the reservoir vents **136** of the pump piston assembly **100**, and eventually out through the tool piston assembly reservoir vents **138**.

Of particular interest is the crowd assembly **60** disposed within the cylindrically shaped valve and manifold housing **88** being the front end of the pump piston assembly **100** as an assemblage of elements is critical to the operation of the apparatus. The crowd assembly **60**, according to the present invention, is a key component of the hydraulic cylinder assembly **50** providing a means for combing multiple essential hydraulic pump elements into a single component thereby significantly reducing the cost and improving the reliability of tool. Referring to FIGS. **5** and **6**, the crowd assembly **60** and piston ball valve **82** combination facilitates the three operating modes of the assembly; the forward stroke, the back stroke, and reversing or releasing stroke. The crowd assembly **60** comprises a cylindrically shaped crowd primary piston **110** slidably disposed within the front end of the valve and manifold housing **88** cavity having a circumferentially expanded portion **112** at the front end wherein the diameter of the expanded portion is equal to the outside diameter of the hydraulic pump piston assembly **100**. The front end of the crowd primary piston **110**, being solid, is pressed by the lower moving handle lever **58** moving the crowd primary piston **110** into the valve and manifold housing **88** cavity closing pump ball valve **82**. With the pump ball valve **82** now closed further depression of the lower moving handle **14** compresses crowd spring **114** centrally disposed within the valve and manifold housing **88**. The crowd spring **114** is captured between the rear end of the crowd primary piston **110** and crowd washer **116** being centrally secured by crowd spring bolt **118** threaded into the rear end of the crowd primary piston **110**. The crowd primary piston **110** longitudinal travel is limited inwardly by the interference of the raised ring portion **70** of release collar **66** and the front end of the pump piston assembly **80** as the raised ring portion **70** is disposed between the circumferentially expanded portion **112** of the release collar **66** and the front end of the piston assembly **100**. The outward longitudinal travel is limited by the interference between the crowd assembly pin **124** and the rear end of the crowd assembly capture slot **120** disposed through the diameter of the crowd

primary piston **110**. Crowd wiper seal **122** disposed between the crowd primary piston **110** and the inside circumference of the valve and manifold housing **88** confines hydraulic fluid within the valve and manifold housing **88**. Slot **120** is elongated to allow the crowd primary piston **110** to move laterally. The crowd assembly pin **124** is perpendicularly fixed across the diameter of the valve and manifold housing **88** and through capture slot **120**. The crowd assembly **66** presses the pump ball valve **82** closed against pump ball valve seat **94** as the crowd assembly **66** is compress during a forward stroke sealing hydraulic fluid within the cavity of the pump piston portion **86** as in the configuration illustrated in FIG. **5**.

Returning to FIG. **4**, during the forward stroke, the captured hydraulic fluid lifts the pump check valve **102** from its seat and flows into the tool cavity **74**. In the event of over pressuring of the press pliers, the crowd spring **114**, having a predetermined spring constant compresses, allowing pump ball valve **82** being biased open by pump valve spring **96** disposed around and between the ball valve pedestal **98** and the valve and manifold housing **88**, therein allowing hydraulic fluid to flow through the reservoir vents **136** penetrating the valve and manifold housing **88** then through the tool piston assembly reservoir vents **138** and back to the hydraulic fluid reservoir **108** encircling a portion of the outside circumference of the tool piston **68** and the a portion of the outside circumference of the tool cylinder **68** of the hydraulic cylinder assembly **50** and defined by a flexible hydraulic reservoir bladder **72**.

In the back stroke configuration of FIG. **7**, the lower moving handle **14** pivots downward from the tool upper stationary handle **12** in preparation for a subsequent compression by the user, the rotation is assisted by handle return spring **130** disposed between the release collar **66** and the tool piston **68**. The handle return spring **130** also retracts the pump piston assembly **100** when the release collar raised ridge **70** engages the crowd primary piston expanded portion **112**. During this back stroke, the pump ball valve **82** lifts from valve seat **94** by the bias of ball valve spring **96** around the pedestal **98**. The pump check valve **102** is now closed, holding fluid within tool cylinder **74**. Also during this back stroke, the pump piston portion **86** is retracted from the pump cylinder **84** thereby facilitating a hydraulic fluid flow from the hydraulic fluid reservoir **108** through the hydraulic fluid reservoir vents **136** and **138** past the now open pump valve **82** and into the pump cylinder **84** thereby replenishing lost fluid from the previous forward stroke. The pump cylinder **84** is now filled with fluid in preparation for the next forward stroke.

In the release configuration of FIG. **8**, the release lever cam **34** is rotated into position to interfere with the release collar **66**. The release lever cam **34** is pivoted around release lever pin **62** fixed to the lower moving handle **14** and into position when the user depresses the release lever handle **16** whilst also depressing the lower moving handle **14**. The motion compresses the handle return spring **130** until the release collar **66** contacts the valve and manifold housing **88** of the hydraulic pump piston assembly **100**. The pump piston portion **86** is pressed further into the pump cylinder **84** whilst the crowd assembly **60** remains inactive and disengaged from the pump ball valve **82** permitting the ball valve **82** to lift from the valve seat **94** providing direct hydraulic fluid connectivity between the pump cylinder **84** and the hydraulic fluid reservoir through hydraulic fluid reservoir vents **136** and **138**. As the hydraulic pump piston assembly **100** moves deeper into the pump cylinder **84**, the piston push pin **90** lifts the pump check valve **102** from the valve seat **104** allowing fluid within the tool cylinder **74** to flow back into the pump cylinder **84**. In this reversing or releasing configuration there is direct hydraulic fluid communication between the tool cylinder **74** and the hydraulic fluid reservoir **108** thereby allowing the fluid volume and pressure to vent allowing the hydraulic cylinder assembly **50** to shorten in length. The low pressure within the hydraulic cylinder assembly **50** relieves the pressure between the serrated jaws **22** and **28** releasing a work piece disposed between the jaws. The tool piston **68** may now be moved into the tool cylinder further as the hydraulic fluid pressure is now relieved allowing the shortening of the hydraulic cylinder assembly **50**. Releasing the hydraulic fluid with the reversing lever **16** allows the hydraulic fluid to return to the reservoir **108** releasing the pressure on a work piece; however, retraction and separation of the jaws **22** and **26** requires a further shortening of the hydraulic cylinder assembly **50**, is user facilitated by a downward movement of the lower serrated jaw **26**. The lower serrated jaw lip **40**, disposed on the front end of the lower serrated jaw **26** provides a lever for a user to depress to accomplish retraction and separation of the jaws **22** and **26** with the tool in this reverse or release configuration.

What is claimed is:

1. A hand operated hydraulic press pliers tool comprising

an upper stationary handle having an upper jaw forming the front end of the upper stationary handle,

a lower jaw having front and rear ends being pivotally fixed to the upper stationary handle disposed to oppose the upper jaw,

a hydraulic cylinder assembly disposed longitudinally within the upper stationary handle and having a rear end being a cylindrically shaped tool cylinder having a bottom pivotally fixed to the upper stationary handle near the upper stationary handle rear end, and a front end being a yoke pivotally fixed to the lower jaw at a location offset between the lower jaw front end and the lower jaw rear end, the hydraulic cylinder assembly comprising

a tool piston assembly being cylindrically shaped and having a tool piston assembly front end fixed to the yoke and a tool piston assembly rear end being a cylindrically shaped tool piston rod slidably received by the tool cylinder,

a hydraulic pump assembly longitudinally and concentrically disposed within the tool piston assembly comprising

a pump piston assembly having

a valve and manifold housing being the front end and having a cylindrical shape with an inside circumference,

a crowd assembly longitudinally and concentrically arranged within the valve and manifold housing,

a pump piston being the rear end, and

a pump ball valve disposed between the crowd assembly of the valve and manifold housing and the pump piston, and

a hydraulic pump assembly pump cylinder, having a bottom and slidably receiving the pump piston, with a pump check valve disposed centrally in the bottom of the pump cylinder, the hydraulic pump assembly having hydraulic fluid direct communication between the pump ball valve and the pump cylinder wherein pressing the crowd assembly into the valve and manifold housing closes the pump ball valve sealing hydraulic fluid within the

pump cylinder and opens the pump check valve creating direct hydraulic fluid communication between the pump cylinder and the tool cylinder; and,

a lower moving handle having a distal end, a proximate end pivotally fixed by a pivot pin to the yoke, and a pump lever disposed near the lower moving handle proximate end and arranged to contact the hydraulic pump assembly of the hydraulic cylinder assembly, and adapted to activate the tool by a user pressing the lower moving handle and the upper stationary handle together to roate the lower moving handle around the proximate end pivot pin moving the distal end towards the upper stationary handle thereby pressing the pump lever towards the hydraulic pump assembly, activating the hydraulic pump assembly, forcing hydraulic fluid into the tool cylinder of the hydraulic cylinder assembly, lengthening the hydraulic cylinder assembly and forcing the upper and lower jaws to close.

2. The press pliers of claim **1** wherein the rear end of the upper stationary handle is a tubular portion.

3. The press pliers of claim **2** wherein a dust cap is fixed to the rear end of the upper stationary handle.

4. The press pliers of claim **1** wherein the tool rod piston has an outside circumference, the tool cylinder has an inside circumference, and the hydraulic cylinder assembly further comprises a tool rod piston seal disposed between the tool rod piston outside circumference and the tool cylinder inside circumference.

5. The press pliers of claim **1** wherein the crowd assembly further comprises a crowd primary piston being cylindrically shaped and having a circumferentially expanded portion being the front end of the crowd primary piston and having a back end receiving a crowd spring bolt retaining a crowd spring between a crowd washer retained by the crowd spring bolt and the back end of the crowd primary piston, and the crowd washer contacting a pump ball valve pedestal holding the pump ball valve in position, the pump ball valve pedestal being surrounded by a pump ball valve spring biasing the pump ball valve open allowing hydraulic fluid flow into the pump cylinder being a back stroke configuration and hydraulic fluid flow out of the pump cylinder being a release stroke configuration.

6. The press pliers of claim **5** wherein the crowd spring is biased to permit the pump ball valve to open when hydraulic fluid pressures within the pump cylinder exceed a preset load capacity of the hydraulic cylinder assembly.

7. The press pliers of claim **1** wherein the pump piston has a push pin extending outwardly and forming the rear end of the pump piston.

8. The press pliers of claim **1** wherein the valve and manifold housing has reservoir vents disposed adjacent to the pump ball valve.

9. The press pliers of claim **8** wherein the hydraulic cylinder assembly further comprises a hydraulic fluid reservoir bladder having front and rear ends, the front end sealed against the outside circumference of the tool piston assembly and the rear end sealed against the outside circumference of the tool cylinder, the tool piston assembly having reservoir vents in direct hydraulic fluid communication with the valve and manifold housing reservoir vents.

10. The press pliers of claim **5** wherein the crowd assembly further comprises a longitudinally arranged crowd capture slot across the diameter of the crowd primary piston with a crowd pin fixed to the valve and manifold housing and disposed within the crowd capture slot wherein the longitudinal travel of the crowd assembly is limited within the valve and manifold housing.

11. The press pliers of claim **5** wherein the tool piston assembly further comprises

a release collar having a raised ridge forming the rear end and disposed between the crowd primary piston expanded portion and the front end of the valve and manifold housing,

a lower moving handle return spring further disposed between the release collar and the hydraulic pump piston assembly biasing the lower moving handle away from the upper stationary handle through the crowd primary piston expanded portion engaging the pump lever of the lower moving handle, and

a front end receiving a release lever cam being the proximate end of a release handle pivotally attached to the lower moving handle wherein the release lever cam pressing the release collar compresses the lower moving handle return spring until the release collar contacts the hydraulic pump piston assembly moving the pump piston to contact and open the pump cylinder check valve.

12. The press pliers of claim **1** further comprising a lower moving handle grip surrounding the distal end of the lower moving handle.

13. The press pliers of claim **1** wherein the upper jaw has downwardly facing serrations and the lower jaw has upwardly facing serrations opposing the serrations of the upper jaw.

14. The press pliers of claim **1** wherein the front end of the lower jaw has a lip extension wherein depressing the extension moves the upper and lower jaws apart when the hydraulic cylinder assembly is vented.

15. The press pliers of claim **5** wherein the crowd assembly further comprises a wiper seal disposed between the outside circumference of the crowd primary piston and the inside circumference of the valve and manifold housing.

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